Geometrix®
Mobile Location Solutions

ANDREW® One Company. A World of Solutions.

Andrew Corporation VoIP Location Identification Server

- **Andrew Corporation Background**
  - Corporate Profile
  - World Leader in Wireless Location Systems:
    - Handset-Based and Network-Based Locating Technologies
    - 911 Caller Location Support (E911 Phase II)
    - Commercial Location-Based-Services (LBS) Support

- **VoIP 911 Location – Current Situation**
  - 911 User/Location Registration
  - 911 Call Routing to Public Safety Answering Points (PSAPs)
  - 911 Call Handling for Nomadic and Mobile VoIP Users
- **Andrew's VoIP Location Identification Server (LIS) Design**
  - LIS Caller Location Identification Functions
  - LIS Position in NENA VoIP 911 Architecture (i2 and i3)
  - LIS Operation With Common VoIP Access Methods
  - VoIP Location Issues Addressed

Our Company

Andrew Corporation is the foremost global supplier of one-stop, end-to-end radio frequency (RF) subsystem solutions.

Andrew Corporation is the world's premier provider of complete RF subsystem solutions for evolving global communications. We are a global leader in the design, manufacture, and supply of communications equipment systems and services. Our products and services provide proven solutions for wireless, fixed-line, and broadband service providers and broadcasters throughout the world.

ANDREW® One Company. A World of Solutions.

Andrew Is a Leader in Wireless Location Systems

- **Leading Provider of Wireless E911 Phase II Location Systems**
  - First 911 Location Systems Deployed in 2001
  - Systems Operating with Tier I, II, and III Operators
  - Extensive Deployments Supporting Millions of Users
- **Leading Provider of Wireless Location Systems for LBS**
  - Systems Deployed Worldwide
  - Multiple Operators
  - Multiple Location Technologies (A-GPS, Enhanced Cell ID, UTDOA, etc.)
  - Optimal Support for all LBS Applications
- **Participation in and Contributor to Standards Efforts for Wireless Location**
  - OMA, 3GPP, etc.

VoIP 911 Caller Location – Current Situation

- **VoIP Users Must Pre-Register Their Location**
  - User must indicate his/her “home” (or other) location to VoIP Provider
  - Registered location determines PSAP to which 911 calls are forwarded
  - Registered location is the physical address indicated to PSAP for emergency response

- **No Automatic Detection of Changed User Location**
  - VoIP Provider cannot detect if user calls 911 from other than his/her registered location
  - Mobile or “Nomadic” VoIP Users may neglect to manually update their registered location when using VoIP in locations other than “home”
  - If VoIP user fails to update his/her location:
    - Calls can be routed to wrong PSAP
    - Incorrect location/address is provided to PSAP

Note: Andrew Corporation does not take a position on the merits of proposals in the pending NPRM in Docket 05-196.

Andrew's Automatic 911 Caller Location Identification for VoIP

Andrew Has Designed a Location Identification Server (LIS) to Automatically Determine the Location of VoIP Users Who Call 911

- Andrew's LIS Design Fits the NENA VoIP 911 Architecture.
- As Designed, Andrew LIS will:
  - Provide Caller Location for VoIP 911 calls: Nomadic, Mobile, and "Home" Locations
  - Work With Any VoIP Access Method: Broadband, Wireless, etc.
  - Require No User Location Registration, Updating or Other Manual Intervention
  - Identify VoIP 911 Caller's Location Within Seconds
- Andrew's LIS Design is Consistent with Both the i2 and i3 Versions of the NENA Architecture.

Automatic 911 Caller Location Identification for VoIP

- **Andrew's VoIP 911 LIS Performs Location Functions Specified by the NENA Architecture Model**
  - Locates VoIP 911 Caller
  - Provides VoIP 911 Caller Location to a VPC (VoIP Position Center) for Forwarding to the Correct PSAP (the PSAP serving the area from which the 911 call originated)
  - Requires an access-specific connection and interface for each access type (DSL, Cable Modem, Wireless, etc.) to retrieve the data required to determine 911 caller location
  - Provides a Critical Component of a VoIP ALI Solution
- **Anticipated Location Performance Comparable to Wireline/Wireless E911 Phase II**
  - Physical Address (MSAG) or Better for Wireline Broadband VoIP Access Methods
  - Location Accuracy Similar to Wireless for Radio Access Methods (WiFi, etc.)
- **Status of Andrew LIS**
  - Design Complete - Leverages Current Wireless Location Products
  - Commercial Service Readiness According to Market Requirements
  - Access-type Development Priority According to Market Requirements
  - LIS Preparation for Commercial Service Will Require Significant Lead Time

NENA defined VoIP 911 architecture

Access
Location

Call routing
Location delivery

Call Handling

ISP

IP

VSP

ISUP

Selective Router

CAMA

Call Server

ESGW

call

LIS
Location Identification Server

VPC
VoIP Position Center

locn

E2+ ESP

ALI
Local

PAM

ALI
National

ERDB

VDB

Geodetic &
Physical Location

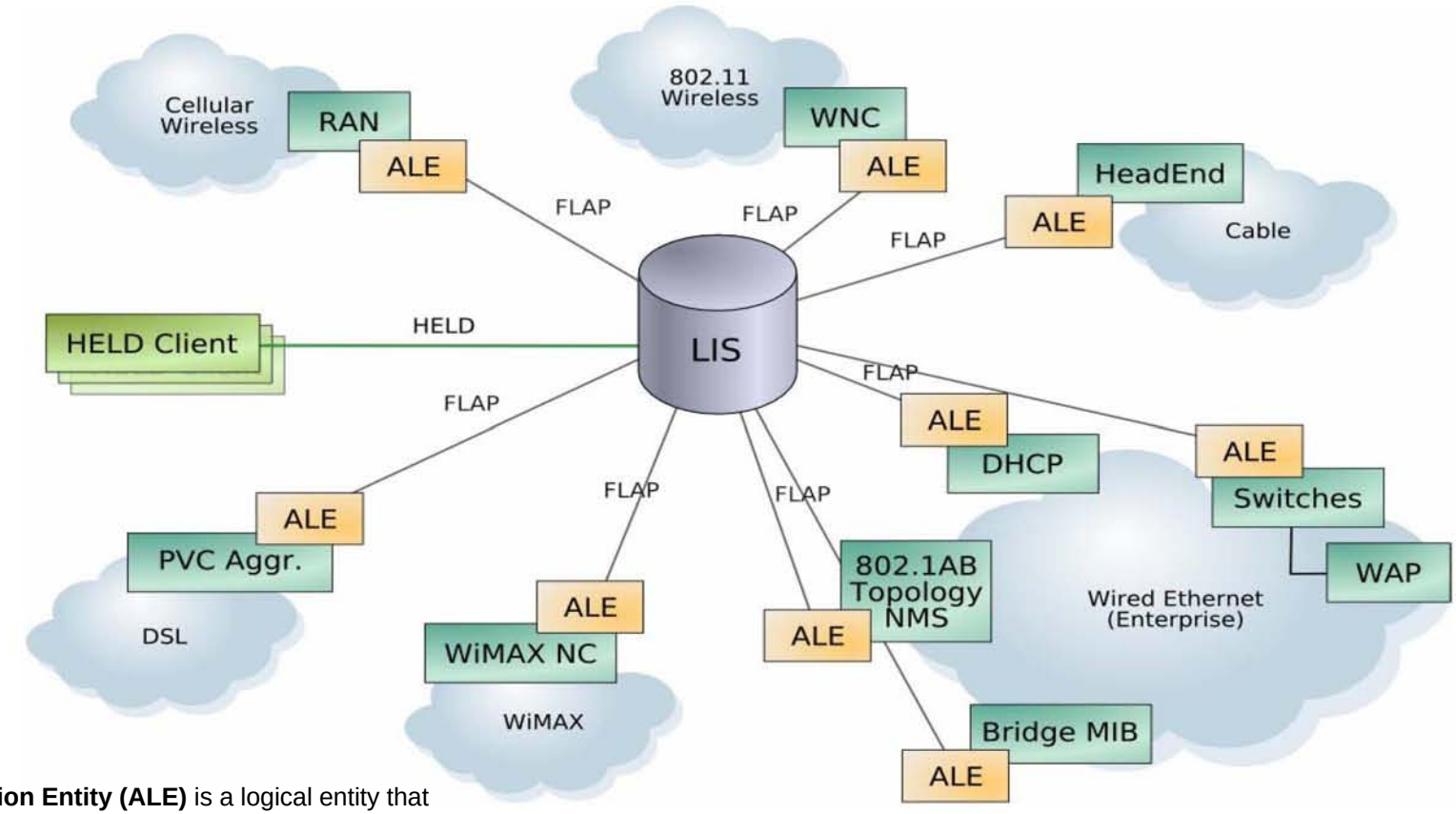
Global ESZ
boundary data

Physical address
MSAG validation

ANDREW One Company. A World of Solutions.

LIS-ALE Implementation Specific to Access Type

(Examples of 6 VoIP Access Methods)



Access Location Entity (ALE) is a logical entity that provides physical information about the IP connection (e.g. Port, etc). Specific implementations will vary depending on the access type.

ALE: Access Location Entity
LIS: Location Identification Server
HELD: HTTP Enabled Location Delivery
FLAP: Flexible LIS-ALE Protocol

DSL and Cable LIS Examples

VoIP User Premises

DSL Provider

BRAS

DSL subscriber

ATU-R

DSLAM

ATM

ALE

Radius

DSL LIS

In a DSL network, Andrew's LIS would retrieve Radius information to derive the physical address for an IP address connected via DSL

Cable Provider

Cable LIS

Cable subscriber

Cable Hub

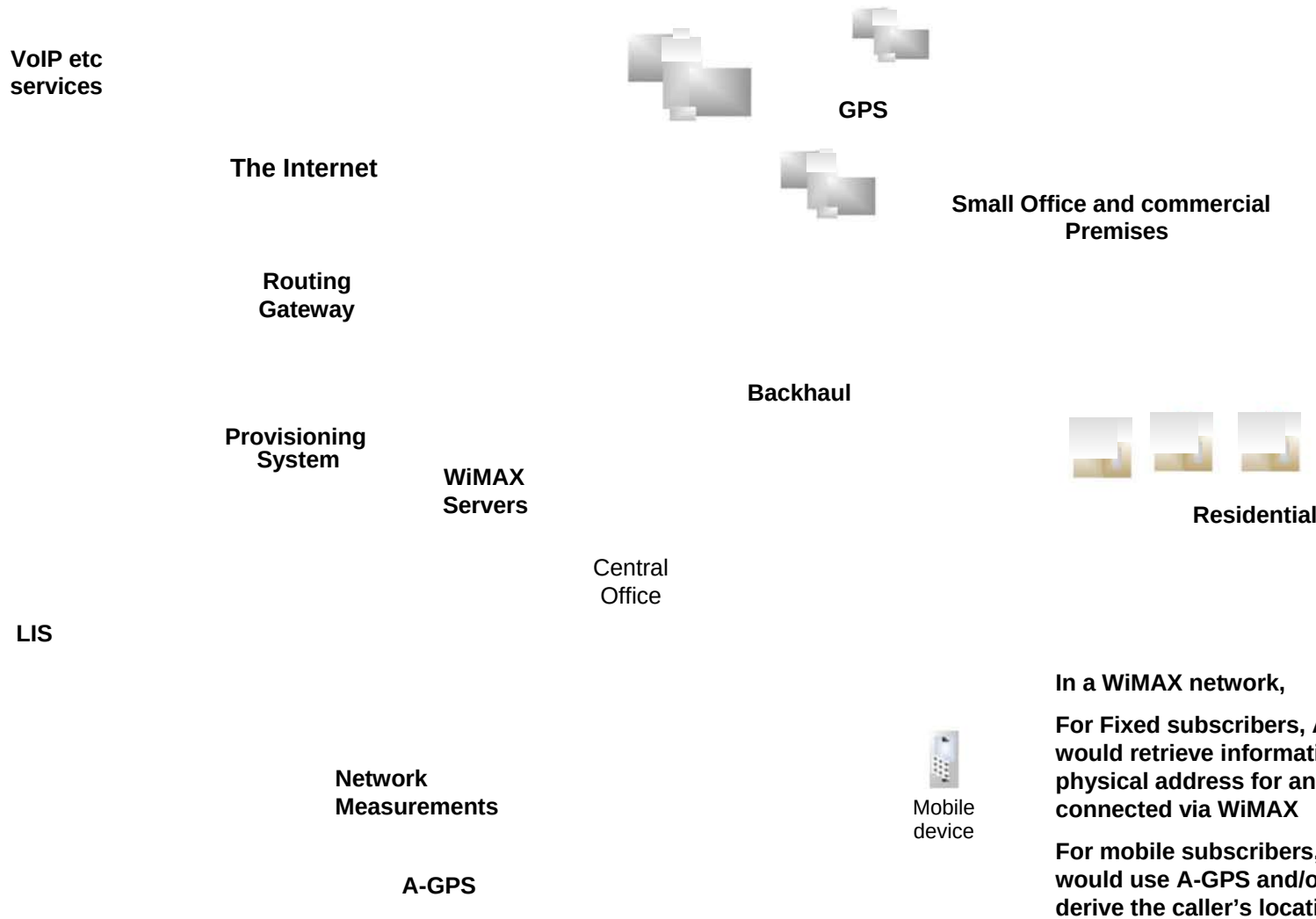
Router

ALE

DHCP

In a cable network, the MAC address of the cable modem seen at the ISP DHCP server can be related to the subscriber location

WiMAX LIS Example – with AGPS and triangulation



In a WiMAX network,

For Fixed subscribers, Andrew's LIS would retrieve information to derive the physical address for an IP address connected via WiMAX

For mobile subscribers, Andrew's LIS would use A-GPS and/or triangulation to derive the caller's location

Summary

- Andrew has designed a VoIP Location Identification Server (LIS) to automatically determine VoIP user location for VoIP 911 calls. With this capability, VoIP 911 calls can be routed to the correct PSAP and indicate the correct location of the caller.
- Andrew's LIS solution requires no user intervention.
- Andrew's LIS solution follows industry standard NENA-defined architecture for performing automatic VoIP 911 caller location.
- Andrew's LIS is designed to provide 911 caller locations for all types of VoIP network access types.
- Andrew's LIS is designed to provide VoIP Position Centers (VPC) with the information required to properly route VoIP 911 calls.
- Andrew anticipates VoIP 911 caller location accuracy, latency, and yield performance comparable to Wireline/Wireless E911 Phase II caller location.

Andrew Corporation VoIP 911 Caller Location Systems

For Additional Information Contact:

- G. Marble
  Director- Business Development
  Andrew Network Solutions
  703-726-5900

- G. Burdett
  Director- Business Development
  Andrew Network Solutions
  703-726-5900